

Factors associated with the decision to investigate child protective services referrals: a systematic review

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Factors Associated with the Decision to Investigate Child Protective Services Referrals:
A Systematic Review

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Background: Limited resources for child protection create challenging decision situations for child protective services (CPS) workers at the point of intake. A body of research has examined the factors associated with worker decisions and processes using a variety of methodological approaches to gain knowledge on decision-making. However, few attempts have been made to systematically review this literature. **Objective:** As part of a larger project on decision-making at intake, this systematic review addressed the question of the factors associated with worker decisions to investigate alleged maltreatment referrals. **Methods:** Quantitative studies that examined factors associated with screening decisions in CPS practice settings were included in the review. Database and other search methods were used to identify research published in English over a 35-year period (1980-2015). **Findings:** Of 1,147 identified sources, 18 studies were selected for full data extraction. The studies were conducted in the U.S., Canada, and Sweden and varied in methodological quality. Most studies examined case factors with few studies examining other domains. **Conclusions:** To inform CPS policy and practice, additional research is needed to examine the relationships between decision-making factors and case outcomes. Greater attention needs to be given to the organizational and external factors that influence decision-making.

Keywords: Screening, Investigation, Decision Making, Maltreatment, Child Protection

INTRODUCTION

Decision-making at the point of child protective services (CPS) intake is a challenge in all developed child protection systems. Across the world and over a significant period of time, CPS agencies have faced stark challenges in achieving responses that minimize the “false positives” that result in unnecessary intrusions into family life and the “false negatives” that result in grave consequences when maltreatment goes undetected (Besharov, 1991, Besharov, 1986, Browne and Saqi, 1988, Thorpe, 1994, Parton et al., 1995, Broadhurst et al., 2009). Such challenges are largely a function of historically insufficient resources, dramatic increases in referrals over time, and ongoing difficulties in maintaining a skilled workforce (General Accounting Office, 1997), and are periodically compounded by child maltreatment tragedies that result in intense public criticism and scrutiny (Ayre, 2001; Pollard, 2017). Challenges extend to the study of child welfare decision-making where the subjectivity of the task, and the complexity of both the decision-making process and of the family difficulties presented, presents unique complications to developing empirical knowledge. Nonetheless, research on child welfare decision-making has become an expansive body of work providing important knowledge across decision points, including screening referrals at intake for further investigation. As part of a larger study on decision-making, this systematic review addressed the question of the factors associated with worker decisions to investigate alleged reports of child maltreatment in quantitative studies over a thirty five-year period. This article provides overviews of the CPS decision-making process at the point of referral and the approach to the empirical study of decisions at this point in the child welfare continuum. The Decision-Making Ecology (DME; Baumann et al., 1997; 2011) is introduced as the review’s conceptual framework, followed by the systematic review. The paper concludes with a discussion of findings and implications for practice and research.

BACKGROUND

When a report of alleged maltreatment is made to a child protection agency, the typical process that CPS workers engage in involves the collection of available information about the alleged victim, the perpetrator of abuse/neglect, and the presenting concern. The decision to assign the referral for investigation (i.e., the screening decision) is generally made based on whether concerns meet definitional or threshold criteria as described by policy to warrant investigation (Child Welfare Information Gateway [CWIG], 2016). If a referral meets the criteria and is “screened in,” an assessment of risk then determines the response priority (CWIG, 2017; Steen & Duran, 2014)). Reports may be “screened out” at this stage if referral information is insufficient or if another authority is deemed most appropriate to respond to concerns (Children's Bureau, 2019). After screening in a report, an investigation is undertaken, and subsequent decisions are made by CPS including the decision to substantiate or remove the child to a place of safety. Where a differential, or alternative, response procedure is in place at intake, referrals that do not meet statutory definitions or thresholds may be offered voluntary services as an alternative to being screened out (Children’s Bureau, 2019). Screened-in referrals may be diverted through alternative response procedures when a worker determines that voluntary services are safe and appropriate, or they may be diverted from services when a worker determines that engagement with the agency is no longer warranted (Morley & Kaplan, 2011).

CPS agencies typically manage a high number of referrals with a smaller proportion resulting in investigation though geographical variation exists (Gilbert et al., 2009). In the U.S., for example, an estimated 4.1 million referrals involving approximately 7.5 million children (Children's Bureau, 2019) were received in 2017 by CPS agencies nationally. Of those referrals received, an average of 57.6% of referrals were screened in for further inquiry with the proportion ranging between 15.6% and 98.3% across jurisdictions (Children's Bureau, 2019). While CPS agencies typically base screening decisions on whether a referral

meets child maltreatment definition or threshold criteria, it is not clear to what extent other factors, such as available resources, may play a role in decision-making (Cross et al., 2014).

Screening decisions present particular challenges for workers, such as managing a high volume of referrals containing limited, vague, or conflicting information (Cross et al., 2014; Saltiel, 2015). Intake workers must also filter referrals within relatively tight timescales and determine if they meet the required maltreatment definitions. Additionally, screening for the likelihood of maltreatment to correctly determine if the investigation is warranted can be challenging given the broad definitions of maltreatment, safeguarding, or significant harm and the potentially complex and changeable circumstances of families (Saltiel, 2015). System pressures and intense public scrutiny present further challenges for workers attempting to ensure the correct decision is made (Munro, 1996). Finally, the use of differential response has additional implications for defining screening decision thresholds (CWIG, 2014).

Current Approaches to Child Welfare Decision-making

Child welfare practice and research related to decision-making has historically focussed on building knowledge to improve the accuracy of worker decisions. The two major approaches that have been applied to achieve this goal can be described as technical and cognitive. Technical approaches, borne from the broader trends towards more technocratic and managerial practices in child welfare (Lees, Meyer, Rafferty, 2011), focus on identifying variables or factors in a CPS referral that predict the most accurate decision. This approach values consistency and standardization acquired through the use of instruments and tools to navigate and support worker decisions. Cognitive approaches focus less on factors and more on the process of decision-making and the use of professional judgments. This approach values knowledge and expertise acquired through experience and the importance of judgement in dynamically complex, real-life situations.

Technical approach to decision-making. Increased attention to CPS screening decisions has intensified interest in technical approaches to improve decision-making (Cull, et al., 2013). Influenced by assessment tools in psychology, the field of child welfare embraced the notion of assessment tools to support worker judgements in the 1980s (Shlonsky & Wagner, 2005). By the early 1990s, formal risk assessment instruments and frameworks (Department of Health, 2000; Hughes & Rycusa, 2006) were under development in child protection systems internationally.

More recently, the use of technical approaches in the screening process has become increasingly standardized (Akin, McDonald, & Tullis, 2010) with the narrowing of models used by the field, and the increasing popularity of Structured Decision Making® (Brown & Packard, 2012; Children's Bureau, 2019). Interest has also grown in the use of predictive analytics (PA) and predictive risk modelling (PRM) (London Councils, no date; Packard, 2016) with the use of algorithms to inform screening decisions at intake. For example, in the US, predictive analytics featured heavily in recommendations by the Commission to Eliminate Child Abuse & Neglect Fatalities (2016) to prevent the most severe forms of maltreatment.

Cognitive approaches to decision-making. In contrast to the technical approaches described, the Munro Review in England emphasized the importance of professional judgements over prescriptive practices and the importance of reflection to strengthen expertise in the field (Munro, 2011). This movement towards enhanced expertise is also evident in the US as states are increasingly adopting centralized intake units (Children's Bureau, 2019) to enhance expertise in referral intake and screening and address variation in screening practices.

Alongside these developments, efforts have been underway to better understand how workers make effective decisions, partly to inform the design of strategies to cultivate

expertise among decision makers. Work by Klein, et al. (1993; 1998) on the Naturalistic Decision Making framework (NDM) and its Recognition-Primed Decision-making model (RPD) has been recently applied to child welfare decision-making (Platt & Turney, 2014; Whittaker, 2018). According to RPD, decision-making is a process that relies on past experience and includes the use of intuition to evaluate situations, mental simulation to predict the future or explain the past, metaphor to draw on and compare experiences, and storytelling to consolidate experiences (Klein, 1998). ShadowBox® training, which is designed to facilitate expertise in decision-making through the use of scenarios and reflective rationale, has been piloted with CPS workers (Newsome, et al., 2015; Newsome & Klein, 2017; Whittaker, 2018). Early findings suggest differences in the ways in which decisions are made between experienced and novice decision-makers, with an over-reliance on procedure among the latter group. Such differences in cognitive processes are important given the context of CPS workplaces where turnover is high, and reliance on procedures is high in efforts to standardize decision-making processes. Cognitive approaches to decision making also contribute to a more nuanced and critical understanding of child welfare decision-making. Opportunities for reflection on how and why decisions are made provide insight into current conceptualisations of child maltreatment and awareness of the ethical dilemmas associated with decision-making.

Conceptual Framework for Child Welfare Decision-making

The Decision-Making Ecology (DME) is a useful organizing framework as it integrates both technical and cognitive approaches through its focus on factors (Decision Making Ecology Framework) and cognitive processes (General Assessment and Decision Making Model). The DME model was first presented in the late 1990s based on early screening research (Baumann, Kern, & Fluke, 1997). In the DME framework, case, decision maker, organizational, and external factors are hypothesized to inform decisions and their

associated outcomes (Figure 1). The DME later incorporated the General Assessment and Decision Making (GADM) model, to include the cognitive process of decision-making (Baumann, et al., 2011). Together, the DME and the GADM provide a framework for understanding how human decisions are made in child welfare. The DME "...takes human error as the starting point for understanding decision-making and suggests that decisions need to be understood within their context" (Baumann, et al., 2011, p. 4).

(INSERT FIGURE 1 ABOUT HERE)

The categorization of technical and cognitive approaches provides a useful structure to begin examining the expansive and diverse body of research on child welfare decision-making. Research on child welfare decision-making typically addresses decision points and processes related to the maltreatment response (e.g., investigation, substantiation, service referral), child placement (e.g., removal, foster care), and case outcomes (e.g., permanency, parental rights termination), with an evidence base more developed at some decision points than others. A recent systematic review was conducted by the National Institute for Health and Care Excellence (2017) in England to identify research published in 2000-2016 on effective tools in recognizing maltreatment at the screening decision point. This latter review identified only three studies, all of which were poor quality, and highlighted a general lack of robust research to inform screening practices. Another systematic review by Lauritzen, Vis, and Fossum (2018) summarized the factors associated with multiple CPS decisions (i.e., decisions to investigate, dismiss, substantiate, and refer families for services) from studies published since 2005 that employed a broad array of methodologies. Over the past 35 years, several studies have been undertaken to build knowledge to inform technical approaches to decision-making at the point of CPS intake. However, to date, no systematic reviews have specifically examined factors associated with worker decisions to investigate referrals of alleged maltreatment. The current review explores factors identified in quantitative studies of

CPS decision-making. A future, yet to be completed, review of qualitative studies will address the cognitive processes associated with decision-making. This review sought to contribute knowledge of the methodological approaches and findings that have been generated in relevant studies over time. For purposes of this systematic review, we use the DME as a conceptual framework to organize and analyze factors associated with CPS screening decisions.

METHODS

The study methodology was guided by approaches described in Bronson and Davis (2012) and Littell, Corcoran, and Pillai (2008), and informed by guidance established by the Cochrane and Campbell Collaboration (Campbell Collaboration, 2014; Cochrane Collaboration, 2012). The research team developed a protocol consistent with PRISMA standards (Moher et al., 2015), which is available upon request.

Eligibility Criteria

Eligible studies included the quantitative examinations of worker decisions to refer alleged maltreatment reports for investigation using data drawn from actual (vs. hypothetical) decision-making settings. Vignettes, or other hypothetical scenarios were excluded. While vignette methodologies offer important contributions to the literature that should not be overlooked, they have been found to have limited transferability to actual decision-making (e.g., Evans et al., 2015). Only sources published in English were included in the review due to resource constraints. Studies included in the review spanned a 35-year period from January 1980 to January 2015. This time period was selected due to potential challenges in accessing studies prior to 1980.

Information Sources

The search strategy included bibliographic database searches; a grey literature search; hand searches of selected journals; and forward and backward reviews of selected sources.

Additional sources were identified through consultation with subject matter experts. Bibliographic databases included Medline (EBSCO), Academic Search Complete (EBSCO), Web of Science (Thomson Reuters), Social Services Abstracts (ProQuest), Social Work Abstracts (EBSCO), and Sociological Abstracts (ProQuest). Websites used for the grey literature search included the Cochrane Guidelines and Library, Google Search, Google Scholar, Child Welfare Information Gateway, National Resource Center for Child Protective Services, Open Grey, British Library Social Welfare Portal, and the Canadian Child Welfare Research Portal. Three journals were hand searched from January 1980 to January 2015: *Child Abuse and Neglect*, *Child Maltreatment*, and *Children and Youth Services Review*.

Search Terms

The terms used to search the bibliographic databases included “child” and “decision,” as well as four terms related to maltreatment, three terms related to research, and eleven terms related to screening (Figure 2). This strategy was further developed to include selected Boolean operators, which were then adapted for each database. Figure 3 provides an example of the search statements used for a single database. Similar terms and search statements were used where possible in the grey literature search.

The bibliographic database, grey literature, and hand searches were undertaken by a research team member between January 27, 2015 and February 17, 2015. The team member continued to identify sources until June 2015 through forward/backward search activity and consultation with experts.

(INSERT FIGURE 2 AND FIGURE 3 ABOUT HERE)

Study Records

Data management and selection process. Bibliographic software EndNote X7 was used to collect, de-duplicate, organize, and manage references and full text documents. After data collection was completed, a two-stage screening process was undertaken to identify

relevant sources for study inclusion. The first stage involved the application of study inclusion criteria to the review of titles and abstracts. The second stage involved applying the same criteria to full text documents selected for inclusion as result of the title and abstract review process. Each phase of the screening process was conducted independently by two raters. Discrepancies were resolved by a third rater. The number of discrepancies identified at each phase was minimal, indicating a high level of inter-rater reliability.

Data extraction. Sources that met study inclusion criteria were subject to data extraction using a form developed by the research team. Information was systematically collected about study sample characteristics, worker characteristics, study methods, and study findings using the DME framework. The study quality was assessed by the research team using established criteria that evaluated the domains of study design, sampling, and internal and external validity. Two raters independently extracted data from the majority of selected sources. Due to staff changes at the end of the study period, a single rater extracted data from the final set of sources. Raters entered data into a single database for comparison and subsequent analysis. No discrepancies were identified in the data collection process. Data extraction included an assessment of quality based on internal and external validity.

FINDINGS

After de-duplication, 1,147 sources were identified for inclusion in the review. Of these, 121 were included for further screening after the title and abstract review. Of the 121 sources reviewed, 22 were subject to full data extraction. Of these 22 sources, two were excluded as they contained duplicate findings, and two others were excluded based on the study criteria. Figure 4 presents a PRISMA (Moher, et al., 2009) flow chart from the initial search results (n=1,505) to the final sample (n=18). Due to page restrictions, only statistically significant factors are presented. Information on nonsignificant associations is available upon request.

(INSERT FIGURE 4 ABOUT HERE)

Study Characteristics

The eighteen studies selected for review (Table 1) were evenly distributed across the 35-year period with four studies published in the 1980s, five studies in the 1990s, five studies in the 2000s, and four studies in the 2010s. Geographical variation among the selected studies was limited with sixteen of the eighteen studies conducted in the U.S., one in Quebec, Canada, and one in Sweden. Of the sixteen U.S. studies, ten were based on three datasets. Six studies (Gryzlak, Wells, & Johnson, 2005; Hutchison, 1988, 1989; Johnson, Brown, & Wells, 2002; Wells, Fluke, & Brown, 1995; Wells, et al., , 2004) relied on data from the Children's Bureau National Screening Study (Grant No. 90-CA-1265). Two studies (Gilbert, Karski, & Frame, 1997; Karski, 1999) reported findings from an Alameda County, CA study following the implementation of an Emergency Response System policy. Two studies (McDaniel, 2003; McDaniel & Slack, 2005) presented data from the Illinois Family Study (IFS) and Department of Children and Families administrative data. Of the remaining eight studies, six collected county, regional, or agency level data using case file (open or closed), administrative, or interview data (Carlson, 1988; Giovannoni, 1987; Jones, 1996; Östberg, 2014; Schwab, Baumann, & Gober, 1997; Silva, 2011). Two studies examined screening at a policy or system level using NCANDS data, in addition to other data sources (Jagannathan & Camasso, 2013; Steen & Duran, 2014). The assessed quality of studies was variable, with studies ranging from poor to good quality.

The majority of studies explored case factors related to the referral, child, caregiver, and family. The remaining factor domains received less attention with organizational factors examined in seven studies and decision maker and external factors examined in only one study.

Many studies examined CPS reports for all maltreatment types, though Carlson (1988) and Silva (2011) examined decision-making for only physical abuse and child sexual abuse cases, respectively. Three studies collected data on all maltreatment types, and then conducted separate analyses for each form of maltreatment (Gilbert et al., 1997; Karski, 1999; Schwab et al., 1997). Most studies employed multivariate statistical analysis and one study used bivariate analysis (Carlson, 1988).

Final sample sizes ranged from 100 to 2,905 children or child referrals, with the exception of Steen and Duran (2014) where U.S. states (n=44) were the unit of analysis. Four studies used single sites (Carlson, 1988; Gilbert et al., 1997; Karski, 1999; Silva, 2011), and remaining studies involved multiple sites, ranging from two to twelve.

(INSERT TABLE 1 ABOUT HERE)

Major Findings

Across studies, 51% to 68% of reports were screened in for investigation. Statistically significant ($p<.05$) factors associated with the decision to investigate and the decision not to investigate were extracted from the eighteen studies, organized by maltreatment type, and categorized according to the DME framework using the following domains: case, decision maker, organizational, and external factors.

Case Factors

Factors in the case domain included those related to the referral, child, caregiver, and family. Referral factors (Table 2) included information on the reporter, CPS report, alleged perpetrator, and nature of allegation. Child factors (Table 3) included number of victims, demographics, and child characteristics. Caregiver factors (Table 3) included caregiver characteristics and parental difficulties. Family factors (Table 3) included family characteristics and major life events.

(INSERT TABLE 2 & 3 ABOUT HERE)

Referral. Reports from mandated reporters (Wells et al., 1995) and professionals including schools (Giovannoni, 1987), law enforcement (Giovannoni, 1987; Schwab et al., 1997), doctors (Schwab et al., 1997), and other authorities (Östberg, 2014) were associated with the decision to investigate. In the case of non-professional reports, referrals by neighbors were significant in two studies (Giovannoni, 1987; Wells et al., 1995). Across studies, parent reports (non-perpetrating parent, parent) were significant as both a factor associated with screening in (Schwab et al., 1997) and screening out (Hutchison, 1988, 1989; Wells et al., 1995) reports. Anonymous reports (Wells et al., 1995) and witnesses to physical abuse reports (Karski, 1999) were also significant in decisions to investigate, but reports from relatives were significantly related to decisions to not investigate (Wells et al., 1995). Report characteristics significantly related to decisions to investigate included the number of reports received (Giovannoni, 1987), reports received in a single day (Hutchison, 1988), and the completeness of the report (Gryzlak et al., 2005; Johnson et al., 2002; Wells et al., 1995).

Maltreatment reports involving a known perpetrator (Wells et al., 1995) were more likely to be investigated than those with unknown perpetrators. A known perpetrator, or knowing the alleged perpetrator's full name, was also associated with the decision to investigate sexual abuse reports (Silva, 2011), as were reports with adults, females, family members or parent figures as alleged perpetrators (Silva, 2011). The perpetrator having a relationship with the child was also associated with the decision to investigate physical abuse reports (Carlson, 1988) and, in the case of mothers, neglect reports (Gilbert et al., 1997). Access to the alleged child victim was also a significant factor in decisions to investigate all maltreatment types (Carlson, 1988; Schwab et al., 1997; Silva, 2011) including, in sexual abuse reports, if the perpetrator lived with the child or if access was unknown (Silva, 2011). Reports with perpetrators who were unknown (Silva, 2011; Wells et al., 1995), a third party, or aged 12 to 17 years were significantly more likely to be screened out (Silva, 2011).

The presence of an injury (Hutchison, 1988, 1989) or a suspicious injury (Carlson, 1988) including an alleged (Carlson, 1988), or even suspected/unknown injury (Johnson et al., 2002) were factors associated with the decision to investigate. The type of injury (Wells et al., 1995) including whether there were visible signs (Carlson, 1988), a face or head injury (Schwab et al., 1997), or an injury of a 5- to 9-year old (Gilbert et al., 1997; Karski, 1999) were also factors significantly related to decisions to investigate. Both injuries that were severe (Gryzlak et al., 2005; Wells et al., 1995), and minor/other injuries or physical conditions (Wells et al., 1995) were significant factors in the decision to investigate. In physical abuse and neglect reports, direct evidence was also a significant factor for screening in reports for investigation (Gilbert et al., 1997; Karski, 1999).

Maltreatment type was also a salient factor: neglect, physical abuse, sexual abuse, and emotional abuse were significantly related to decisions to investigate (Gilbert et al., 1997; Gryzlak et al., 2005; Hutchison, 1988, 1989; Jones, 1996; Karski, 1999; Östberg, 2014; Wells et al., 1995). However, in the case of sexual abuse reports where more precise measures were used, reports described as “rape” or “assault” were associated with decisions not to investigate (Silva, 2011).

Child. Case factors relevant to the alleged child victim included number of victims, demographics, and characteristics. More than one child, or multiple victims, was associated with decisions to investigate across maltreatment types (Wells et al., 1995), and neglect specifically (Schwab et al., 1997). A child’s younger age was also relevant to screening decisions with children less than two years (Gryzlak et al., 2005; Wells et al., 1995), less than six years from certain referral sources (Johnson et al., 2002), less than seven years in cases of neglect (all types) and physical abuse (Schwab et al., 1997), or between the age of 2 to 12 years compared to teens (Gryzlak et al., 2005) more likely to receive an investigative response. Findings related to gender were mixed with female victims more likely to be

investigated in some studies (Gilbert et al., 1997; Östberg, 2014) and to be screened out in others (Gryzlak et al., 2005; Wells et al., 1995). Ethnicity was significant (Wells et al., 1995) for decisions to investigate in two studies using the Children's Bureau Screening Study data, but dependent on site when tested as an interaction (Gryzlak et al., 2005).

Additional child characteristics included a child being unable to protect themselves (neglect or physical abuse), being fearful (physical abuse), and the child's physical condition (medical neglect). Child characteristics associated with screening out were a behavior disorder (Giovannoni, 1987) or, in reports of physical abuse, hostile or aggressive behavior (Schwab et al., 1997). However, school problems were associated with the decision to investigate (Giovannoni, 1987).

Caregiver. Case factors relevant to the caregiver included caregiver characteristics and parental difficulties. Caregiver educational level and presence of a learning disability (McDaniel, 2003; McDaniel & Slack, 2005) were associated with the decision to investigate. Referrals indicating drug use in neglect or physical abuse cases, or emotional problems in cases of refusal to accept parental responsibility, were also associated with the investigation decision (Gilbert et al., 1997). However, a caregiver's experience of abuse as a child was significantly associated with the decision not to investigate (McDaniel, 2003; McDaniel & Slack, 2005).

Schwab et al. (1997) identified a number of parenting difficulties associated with the decision to investigate: inappropriate discipline (in emotional and physical abuse cases), a negative view of child (in medical neglect, and cases of caregiver refusal to accept parental responsibility), rejection by caretaker (in emotional abuse cases), name calling by the caretaker (in cases of emotional abuse), caregiver aggressive behavior/anger toward child (in emotional abuse cases), and caretaker views of the child as a burden or unwanted (in abandonment cases, and cases where a caregiver refuses to accept parental responsibility). A

caregiver not seeking medical treatment was also significant in reports of emotional abuse. While Schwab et al. (1997) found inability to cope as a significant factor associated with the decision to screen out reports of physical abuse, Östberg (2014) found that parents' need for relief (from the child) was a significant factor in decisions to assign a case for investigation.

Family. Case factors relevant to the family included family characteristics and major life events. Factors such as multiple children (McDaniel, 2003; McDaniel & Slack, 2005), or a large number of siblings in reports of sexual abuse (Silva, 2011), were associated with decisions to investigate. Reports with unknown household types were significantly more likely to be screened out (Wells et al., 1995). Open cases (Hutchison, 1988, 1989; Silva, 2011) or prior CPS involvement were factors consistently associated with the decision to investigate across multiple studies, as were prior reports (Carlson, 1988; Wells et al., 1995), incidents (Silva, 2011), investigations (Gilbert et al., 1997; Karski, 1999), or substantiation (Schwab et al., 1997). Receipt of cash assistance (AFDC, and later TANF), currently (Gilbert et al., 1997; Karski, 1999), and in the prior 3 months (McDaniel, 2003; McDaniel & Slack, 2005) was also associated with the decision to investigate. In the case of neglect reports, AFDC receipt was significantly associated with the investigation decision but, in physical abuse cases, only when there was a child aged 0 to 4 years (Gilbert et al., 1997; Karski, 1999). Reports were less likely to be screened in for investigation when cash assistance had ended in the month prior, or where the family of concern had a higher income, or when an income was greater than \$12,500 (McDaniel, 2003; McDaniel & Slack, 2005). Other family factors associated with the decision to investigate included inadequate housing (Giovannoni, 1987), unspecified environmental factors (Jones, 1996), or a lack of child custody issues or arrangements (Gilbert et al., 1997; Karski, 1999). Major life events associated with decisions to investigate ranged from a birth, school suspension, a family move, to arrest (McDaniel, 2003; McDaniel & Slack, 2005) while a convicted criminal

offence was associated with the decision to not investigate in cases of physical abuse (Schwab et al., 1997).

Decision Maker, Organizational, and External Factors

Studies had a more limited focus on factors within the remaining DME domains of decision maker, organizational, and external factors (Table 4). Decision maker factors focussed on worker beliefs. Organizational factors focussed on site differences, workforce, and supervision factors. External factors addressed were population and child maltreatment trends and community relationships.

(INSERT TABLE 4 ABOUT HERE)

Decision maker. In a study that examined worker beliefs in relation to screening decisions, the belief that CPS should investigate every incident of a child being at risk of harm, and the belief that the decision to investigate is irrespective of the availability of community resources were both associated with decisions to investigate (Wells et al., 2004).

Organizational. At the organizational level, site level differences were associated with screening decisions after controlling for other factors (Gryzlak et al., 2005; Johnson et al., 2002; Wells et al., 1995; Wells et al., 2004). Decision-making from site to site varied by injury type, report completeness, age of youngest child (Johnson et al., 2002), ethnicity, and when no harm was reported (Hutchison, 1989). Site differences in the time between contact and decision varied by site, and site structure was also relevant, with integrated rather than specialized units more likely to investigate (Östberg, 2014). In addition to site differences, agency specific practices were related to the decision to investigate including consultation with a manager prior to decision-making in sexual abuse reports (Silva, 2011). Increases in CPS staff were also associated with increased investigation rates (Jagannathan & Camasso, 2013).

External. External factors associated with screening decisions included community-level maltreatment trends, population trends, and community relationships. Both an increased proportion of neglect reports and neglect cases were associated with decisions to investigate (Wells et al., 2004). Other trends such as increases in the numbers of families with children, and increases in median income were associated with decisions to not investigate. Finally, how community contacts perceived their relationship with CPS was important, with positive relationships associated with decisions to investigate.

DISCUSSION

The purpose of this systematic review was to summarize a discrete body of decision-making research on factors associated with CPS screening decisions at intake that was developed to inform technical approaches to decision-making. We examined 18 empirical studies published over a 35-year period, the majority of which were conducted in the U.S. Study findings revealed a broad range of factors to be significantly associated with both the decision to investigate and to not investigate CPS referrals. While measurement varied from study to study, in general, measurement was somewhat limited across the domains of the DME with an emphasis on case factors. Across studies, case factors associated with intake decisions included including reporter type, nature of the report, severity of the allegation, child's age, a family's prior CPS involvement, and maltreatment type. Findings specific to the case, such as referral information, highlight the dual purpose of the screening decision: to identify potential cases of maltreatment and to manage referral volume. Incomplete referrals and referrals with unnamed perpetrators were significantly related to decisions to not investigate. While professionals were likely to have their reports investigated, this was not always the case for parents, friends, and relatives. Notably, some case factors were associated with decisions to investigate only for specific maltreatment types, suggesting intake decision processes vary depending on the type of maltreatment alleged.

The incorporation of case factors related to the child, caregiver, and family in study designs were more limited yet highlighted some interesting differences. For example, referrals involving children with challenging behaviors or a parent with a history of abuse as a child were significantly associated with decisions to not investigate. However, a parent with a learning disability or substance abuse concern, or a family with a larger number of children, receiving public benefits, or experiencing housing issues were significantly associated with decisions to investigate. These difficulties may all indicate risk factors and a need for support, and suggest that decisions to investigate need to be considered in a wider context, including how vulnerable populations are supported in communities and society. Notably, other variables typically associated with risk and protective factors for child maltreatment, such as parental age, domestic violence, and social support (Brown et al., 1998, Browne and Saqi, 1988), were absent from study designs.

Decision maker, organizational, and external factors were addressed less frequently in study designs, but findings from studies that incorporated these factors underscore the relevance of worker beliefs and site characteristics to screening decisions. For example, workers with more risk-averse beliefs were significantly associated with decisions to investigate, and specific case factors, such as child age, race, or injury type were screened in more readily in some sites than others. These findings have important implications for children of different ages and racial/ethnic backgrounds, as well as children experiencing varying levels of harm (Johnson, Brown & Wells, 2002; Hutchison, 1989).

Study Limitations

Studies included in the review were of variable and, in some cases, poor quality. Studies were also primarily from the U.S. so the relevance of findings to other countries may be limited given variations in practice, policy, and cultural context. The methodological diversity of the studies reviewed limited our ability to apply summary statistical techniques

such as meta-analysis, thereby limiting the generalizability of the results. Studies prior to 1980 were also excluded. It is possible that earlier grey literature sources may have been missed. It is also possible that our review suffers from biases associated with history as report volumes, child welfare policies, demographics, income inequality, and other environmental factors have changed over the 35-year period covered by the review, dynamics that may influence screening decisions over time. Further, our search criteria did not identify research on screening tools, specifically the factors used in standardized screening instruments.

Limitations also exist across the studies reviewed. In addition to the limited number of variables examined in many studies, where selected studies involved prospective, actual decision-making, these studies were prone to social desirability bias among participants who may have made decisions differently in the absence of study conditions. Further, the design and methodological concerns in some studies suggest findings that are exploratory in nature and results that should be treated cautiously (Carlson, 1988; Giovannoni, 1987; Gryzlak et al., 2005) due to small size and limited power to detect significant results (Steen & Duran, 2014). Finally, the presentation of study methods and findings were limited in some studies (Jagannathan & Camasso, 2013; Karski, 1999; Östberg, 2014), which limited the study team's evaluation of methodological quality.

Implications

The studies reviewed sought to identify characteristics associated with decision-making at the point of CPS intake to improve child welfare decision-making through technical approaches. However, a review of screening decision studies with qualitative analysis and case studies is needed to explore the cognitive processes associated with worker decision-making. Future research on screening decisions must attend to both the how and why of decision-making given the unclear, complex, and changing circumstances of the screening decision-making process. Future research should seek to incorporate qualitative

observations and insights at the practice level to elucidate the cognitive, emotional, behavioural, interpersonal and cultural context in which workers use these factors to make decisions. Future research is also needed to examine why these factors, individually and collectively, are viewed as important to workers and how workers process these multiple factors to formulate a decision. This focus can also provide new insight into why decisions are made differently across workers, sites, and points in time.

Future research is also needed to ensure sufficient attention to all factor across DME domains (case, decision maker, organizational, external) and to recognize factors that may both directly and indirectly influence worker decisions. A critical direction for future research is to examine referral and case decision-making factors in relation to the existing knowledge base on maltreatment indicators, risk, protective factors, and outcomes to understand the relevance and evidence-base for these factors as important to effective decision-making. For example, risk factors associated with child maltreatment such as parental substance abuse, poor mental health, and domestic violence have not been consistently studied in screening decision research but are frequent grounds for concerns in CPS referrals. Organizational and external factors are equally important in the context of screening decisions, such as the relationship between decision-making and how CPS agencies and communities respond to the demand for and use of resources. Future research on factors associated with screening would also benefit from exploring the interactions, groupings, combined influence of the variables identified using advanced statistical methods. Such approaches would offer a more integrated understanding of these influential factors within and between DME factor domains and provide insight into how decision processes may vary depending on the type of maltreatment alleged. Finally, none of the studies examined the accuracy of the decisions that were made and future research on decision-making effectiveness is needed. This includes both the extent to which decisions accurately screen

child protection referrals and decisions influence child and family outcomes. Relatedly, future research needs to also consider how the role of supervision or decision-making in teams contributes to effective decision-making.

This study also provides preliminary practice implications given the gaps in knowledge on factors associated with screening decisions. Developing expertise in decision-making requires the use of reflective and critical thinking to consider factors individually and collectively. CPS workers need to have feedback on their decisions and opportunities for reflection to consider how factors inform their own decision-making and the practice or empirical evidence-base to support these factors in the context of indicators, risk, and protection. For example, Keddell (2014, p. 931) recognizes the social justice issues that may exist for families involved with CPS, such as those living in poverty, and the pivotal role of decision-making in determining the CPS respond to family difficulties. Keddell argues for attending to not only how decisions are made, but also developing a focus on what decisions *should be* made. For example, a screening decision when a low-income family lacks access to community supports or services to prevent crisis. Factors identified in this study raise questions about how workers are using a social justice lens when screening CPS referrals. Keddell (2014) suggests decision-making principles at each decision point to retain this lens and the use of critical reflection. Critical reflections by workers of such factors identified in this review can ensure workers maintain a focus on the social work profession's person-in-environment perspective and attend to the organisational and external context (social, political, economic, and otherwise) of decision-making. For example, opportunities for workers to reflect on the influence of DME external factors such as inequality, organizational budget constraints, political ideology or media influence on their individual decision-making practices are important to achieve both effective and just decision-making practices.

Findings from this study also highlight the presence of procedural factors within the DME organisational domain, including the completeness of referral, the name of the alleged perpetrator provided, and the number of reports received about an incident. While sufficient information is essential, it is important that decision-making is not procedurally-led. Early work by Newsome, et al., 2015 on novice and expert decision-makers in child welfare involving tests of the Recognition-primed decision-making model (RPD) referred to earlier, and in the context of CPS decision-making has identified two types of decision makers: (a) inquisitive and critical thinkers that rely on pattern recognition and mental simulation (*Investigators*), and (b) novices that rely on procedural knowledge outlined in structured assessment tools to justify decisions (*Proceduralists*) (Newsome et al., 2015). The demands and pressures on CPS workers have contributed to a prioritization of procedural factors; yet reflective spaces and feedback loops are important to strengthen pattern recognition and critical thinking over time.

CONCLUSION

This systematic review was a first step in examining the extensive body of work on child welfare decision-making with a focus on screening decisions and the factors associated with them across DME domains. In addition to identifying important research and practice implications, this review highlights the limited knowledge that exists in the field on particular decision points, despite the wealth of literature on the topic more broadly. This review also highlights the importance of attending to factors across DME domains in recognition of the less visible but equally influential factors that inform decision-making. Further reviews are needed to organize and synthesize information to prompt decision-making practice advances and future research on effective and just decision-making.

Figure 1: *Decision Making Ecology Framework*

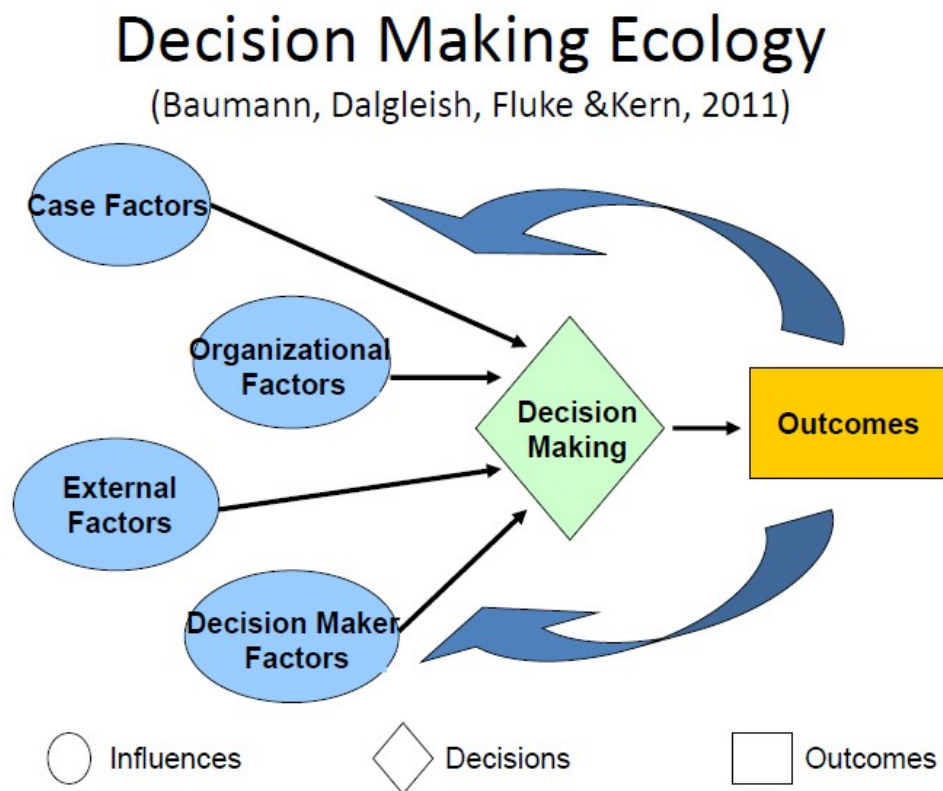


Figure 2: *Search Terms*

1. Child Welfare	Child* (and) maltreatment
	Child* (and) abuse
	Child* (and) protect*
	Child* (and) neglect
2. Research	Research
	Study
	Studies
3. Decision	Decision* (and) assessment
	Decision (and) criteria
	Decision (and) screen*
	Decision (and) investigation
	Decision (and) threshold
	Decision (and) inquiry
	Decision (and) enquiry
	Decision (and) discretion
	Decision (and) referral
	Decision (and) conference
	Decision (and) intake
4. Combine 1 & 2	
5. Combine 3&4	

Figure 3: *Search Statements*

Web of Science (Thomson Reuters) – January 27, 2015			
Search No.	Search Terms		Results
1	TS= (Child* AND (maltreat* OR abuse OR protect* OR neglect))	Advanced Search (TS=Topic Search) No date filter	72,787
2	TS= (research OR study OR studies)	Advanced Search (TS=Topic Search) No date filter	11,134,266
3	TS = (decision* AND (assessment OR criteria OR screen* OR investigation OR threshold OR inquiry OR enquiry OR discretion OR referral OR conference OR intake))	Advanced Search (TS=Topic Search) No date filter	102,910
4	#1 AND #2	No date filter	42,360
5	#4 AND #3	No date filter	512

Figure 4: *PRISMA (2009) Flow Chart*

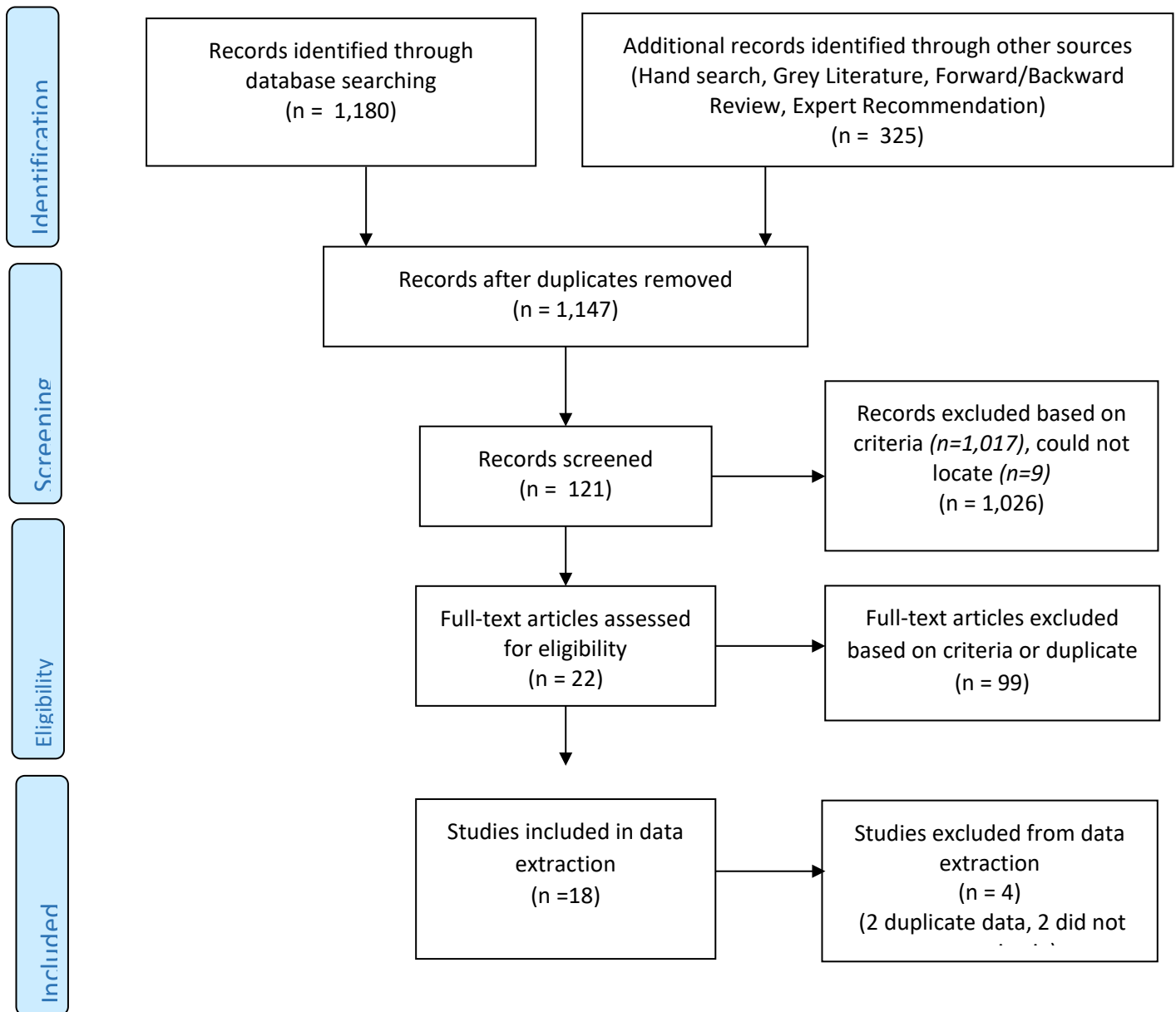


Table 1: *Description of Selected Studies*

Author & Year	Study Purpose	Study Methods & Analysis	Data source	Final Sample Size (N=)	% investigated	Quality Criteria Rating
Emergency Response System Study, Alameda County, CA						
Gilbert et al. (1997)	Examines factors with case opening and disposition following policy change	Single site, logistic regression	Case records, worker interviews	N=550	n/a	Adequate quality. small N in some groups
Karski (1999)	Examines case factors in decision to screen in, and to refer to court	Single site, logistic regression	Case records	N=550	n/a	Poor quality, insufficient reporting of methods
Children's Bureau Screening Study						
Gryzlak et al. (2005)	Examines site differences in factors used and role of race/ethnicity in screening decisions	12 sites across 5 states, logistic regression	New referrals in study period (study instrument)	N=2,504	51%	Good quality, sample lacked diversity, limited worker analysis
Hutchison (1988)	Identifies predictive factors in screening and substantiations decisions	Two semi-urban offices in MA, logistic regression	New referrals in study period (study instrument)	N=228	62.3%	Adequate quality, limitations in sample representation and statistical analysis
Hutchison (1989)	Explores interaction of variables on screening and substantiation	Two semi-urban offices in MA, logistic regression	New referrals in study period (study instrument)	N=228	62.3%	Adequate quality, notable site differences
Johnson et al. (2002)	Uses classification and regression trees (CART) to predict factors in screening decisions	12 sites across 5 states, CART	New referrals in study period (study instrument)	N=1,789 (meet legal definition)	66% (Sites varied from 33% to 100%)	Good quality, robust statistical analysis
Wells et al. (1995)	Identifies influence of case characteristics on screening decisions	12 sites across 5 states, logistic regression	New referrals in study period (study instrument)	N=1,789 (meet legal definition)	66%	Good quality, large sample, multiple sites
Wells et al. (2004)	Examines relationship between ecological factors and screening decisions	12 sites across 5 states, OLS regression, ANOVA	Case abstracting form, staff surveys, community surveys	N=1,417 (legal def+worker survey completed)	68%	Good quality, large sample, multiple sites
Illinois Family Study Data						

McDaniel (2003)	Explores relationship between major life events in low-income families and CPS involvement	Longitudinal design; logistic regression, event history analysis	Illinois Family Study (IFS) and DCF Admin data	N=1,137	n/a	Good quality, robust methods, indirect study purpose
McDaniel and Slack (2005)	Explores relationship between factors and major life events on screening decisions	Longitudinal design; discrete time event history analysis	Illinois Family Study (IFS) and DCF Admin data	N=1,137	n/a	Good quality, robust methods, indirect study purpose
Other Studies						
Carlson (1988)	Identifies case factors used in screening in physical abuse referrals	Survey research design, San Diego County CPS, chi-square	Closed cases, Screening Unit	N=100	n/a	Poor quality, design limitations
Giovannoni (1987)	Examines reporter characteristics on substantiation decisions (part screening decisions)	3/9 urban county sites for screening decision analysis; discriminant analysis	New referrals in study period (study instrument); worker interviews	N=644	n/a	Poor quality, sampling methods and analysis limitations
Jagannathan and Camasso (2013)	Assesses the impact of social outrage on CPS decision	Secondary data; panel regression analysis	NCANDS data, 1992-2008	N=867	n/a	Poor quality, insufficient reporting of methods
Jones (1996)	Examines CPS decision points and risk to determine if appropriate	9 offices/teams in English county; audit approach	Case files, supervisor interviews, audit tool	N=275	21%-79% by site	Poor quality, potential for bias, insufficient reporting of findings
Östberg (2014)	Identifies factors influencing screening decision	Two agencies in Sweden; logistic regression	Worker survey	N=260	Not known	Poor quality, insufficient reporting of methods and analysis
Silva (2011)	Identifies case factors (sexual abuse) on screening decisions	Montréal, Quebec CPS agency; logistic regression	Case file, administrative data	N=303	53%	Adequate quality, initial sample size not reported, single site
Steen and Duran (2014)	Examines impact of policies, structures on activity rates	Secondary multi-source data, linear regression	NCANDS, other sources	N=44 (unit = State)	M=56% across states (27,470 per 1,000 minor residents)	Poor quality, potential for bias, inadequate reporting of methods and findings

Schwab et al. (1997)	Identifies variables that predict, and patterns in, decision-making	Two regional sites (TX), discriminant analysis	Case file	N=2,905	67%	Adequate quality, sampling limitations and insufficient reporting of findings
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Table 2: Case Factors (Referral) Associated with Screening Decisions by Maltreatment Type

Domains	FACTORS ASSOCIATED WITH DECISION TO INVESTIGATE ($p<.05$)						FACTORS ASSOCIATED WITH DECISION NOT TO INVESTIGATE ($p<.05$)		
	All Types	Emotional	Neglect (by neglect type)	Physical	Sexual	Other	All Types	Physical	Sexual
Referral: Reporter									
Professional	Mandated (17 ^a); School, Law Enforcement (3); Other Authority (13)	Doctor (14)		Law Enforcement (14)					
Non-Professional	Parent (14), Neighbor (3; 17 ^a), Non-family member (2 ^b)						Non-perpetrator parent (5 ^a ;6 ^a , 17 ^a), parent, self, friend, relative, other (17 ^a)		
Other	Other than Self-Report or Non-Perp Parent (4 ^a); Anonymous (17 ^a)			Witnessed Abuse (10 ^b);					
Referral: Report									
Number of Reports/Processing	No. Reported Incidents (3), Reports in a Single Day (5) Report Completeness (4 ^a ;17 ^a)		Report Completeness (8 ^a) (Physical)		Report Completeness (8 ^a) Not known if police aware (15)	Report Completeness (8 ^a) (multiple types of maltreatment)	Incomplete non-sexual report by friend, relative, non-perpetrator parent (8 ^a)		Parent or Police aware (15) Police report no. (15) Higher no. days from

					referral to decision (15) Actual/attempted parent contact prior to decision (15)
Referral: Alleged Perpetrator					
Perpetrator or Characteristics	Known (17 ^a)	Mother (2) (Physical)	Relationship to child (1)	Known, Full Name Known, Family Member/Parental Figure, Female, Age 18+ (15)	Unknown (17 ^a ; 15); Third Party (15H); Aged 12-17yrs (15)
Access to Child		Access to, lived with child (14)	Access to, lived with child (1; 14)	Access to, lived with child (14; 15); Access unknown (15)	
Referral: Nature of Allegation					
Presence of Injury	Injury (8 ^a ; 9)	Suspected, unknown (8 ^a)	Alleged, Suspicions (1); Suspected, unknown (8 ^a)	Suspected, unknown (8 ^a) (fostering delinquency)	

Type of Injury	Injury type (17 ^a)	Visible signs (1); Face or Head Injury (14); Injury of 5-9 yr. old (2 ^b ; 10 ^b)	
Severity of Injury/Incident	Seriousness of Incident (3); Severe injury (4 ^a ; 17 ^a); Minor/other injury or physical condition (17 ^a)	Risk of harm to child (14)	
Direct Evidence		Direct Evidence (2 ^b ; 10 ^b) (Physical)	
Maltreatment Type	Neglect (5 ^a); Neglect >3 yrs. of age (2); Physical (6 ^a ; 13); Sexual (2 ^b ; 4 ^a ; 5 ^a ; 6 ^a ; 9; 10 ^b ; 13; 17 ^a); Sexual regardless of report completeness (8 ^a); Sexual with other maltreatment types (15); Emotional (9)		Child Sexual Abuse referred to as “rape” or “assault” (15)

Table 3: Case (Child, Caregiver, & Family) Factors Associated with Screening Decisions by Maltreatment Type

Domains	FACTORS ASSOCIATED WITH DECISION TO INVESTIGATE ($p<.05$)						FACTORS ASSOCIATED WITH DECISION NOT TO INVESTIGATE ($p<.05$)		
	All Types	Emotional	Neglect (by neglect type)	Physical	Sexual	Other	All Types	Physical	Sexual
Child: Single/Multiple Victims									
Single/Multiple Victims	More than One Child/Several Victims (17 ^a)		More than One Child/Several Victims (14) (Medical)						
Child: Demographics									
Age	Age (17 ^a); Age <2yrs (4 ^a ; 17 ^a); Age 2-12yrs compared to teens (4 ^a); Age <6yrs from some referral sources (8 ^a)		Age <7yrs (14) (Physical) Age <7yrs (14) (Medical) Age <7yrs (14) (Supervisory)	Age <7yrs (14)					
Gender	Female (13;2)						Female child, all female (4 ^a ; 17 ^a)		
Ethnicity	Ethnicity (17)								
Child: Characteristics									
	School problems (3)		Cannot protect self, Physical Condition	Cannot protect self, Fearful (14)			Behavior disorder (3)	Hostile or aggressive (14)	

			(14) (Medical) Cannot protect self (14) (Supervisor y)	
Caregiver: Characteristics				
	High School/GED (12°); learning disability (11°;12°)			Convicted of criminal offence (14)
Caregiver: Parental Difficulties				
Substance Abuse	Referral notes drug use (2)	Parental drug use (2) (Physical)	Parental drug use (2)	
Other		Emotional problems (14) (refusal to accept responsibilit y)		Abused as child (11°;12°)
Parenting Difficulti es	Parent Need for Relief (13)	Inappropriat e Discipline, No Medical Treatment, Rejection by Caretaker, Name Calling by Caretaker, Caregiver aggressive/a	Negative View of Child (14) (Medical) Negative View of Child (14); Caretaker views child as burden/unw anted (14) (refusal to accept	Inappropri ate Discipline (14)
				Unable to cope (14)

		nger to child (14)	responsibilit y; abandonme nt)			
Family: Characteristics						
Number of children	Having more children (11 ^c ; 12 ^c)				Higher number of Siblings (15)	Household type unknown (17)
Prior CPS Involvem ent	Prior: Reports (17), Involvement (12 ^c ;11 ^c); Open case (6 ^a ;5 ^a)	Substantiati on (14)	Investigatio n (2 ^b ;10) (Physical) Substantiati on (14) (failure to accept responsibilit y)	Prior: Reports (1), Substanti ation (14)	Incident, Open case (15)	
Income or Cash Assistanc e	Receiving TANF, and in prior 3 months (12 ^c ;11 ^c)		AFDC receipt (2 ^b ;10 ^b) (Physical)	AFDC*ch ild age 0- 4yrs (2 ^b ;10 ^b)		Off TANF 1mth, Higher Income (12 ^c); Income <\$12.5K (11 ^c)
Other Family Difficulti es	Inadequate Housing (3); Environmental Factors (9)					
Child Custody Issues	No Custody Issues (2)		No Custody Issues (2 ^b ;10 ^b) (Physical)		Custody arrangeme nts known (15)	
Family: Major Life Events						

Child Birth	Birth in prior 1-3 mths, 4-6 mths, 12 mths (11 ^c ;12 ^c)
School Suspension	Suspension or expulsion; In prior 12 mths (11)
Move	Move at least once in prior 12 mths; in 12 mths prior to Wave 1 (11 ^c ;12 ^c)
Arrest	Arrest in prior 1-6 mths (11 ^c ; 12 ^c)
Other	Multiple life events in prior 12 mths (11)

Table 4: *Decision Maker, Organizational, & External Factors Associated with Screening Decisions by Maltreatment Type*

Domains	FACTORS ASSOCIATED WITH DECISION TO INVESTIGATE ($p<.05$)		FACTORS ASSOCIATED WITH DECISION NOT TO INVESTIGATE ($p<.05$)
	All Types	Sexual	All Types
DECISION MAKER FACTORS			
Worker Beliefs	Belief CPS should investigate “whenever a child is at risk of harm” (18) Belief community resource availability had “no effect” on decision (18)		
ORGANIZATIONAL FACTORS			
Site			
Site Differences	Site (after controlling for other factors) (4 ^a ; 8 ^a ;17 ^a ;18 ^a) Site differences in time between contact and decision (18) Integrated rather than Specialized Intake Office (Sweden) (13) Site decisions varied based on injury type, report completeness, or age of youngest child (8) Site predicted screening decision in CPS reports involving no harm (6) Nonwhite families screened in depending on the area office (6)		
Site: Other	Site decisions varied based on injury type, report completeness, or age of youngest child (8)		
Site: Interaction w/ Factors	Site predicted screening decision in CPS reports involving no harm (6) Nonwhite families screened in depending on the area office (6)		
Workforce	Marked CPS workforce increase (increased rate of screened in reports) (7)		
Supervision		Consultation with manager prior to decision (15)	
EXTERNAL FACTORS			
Maltreatment Trends	Increased proportion of neglect reports (18) Increased proportion of neglect cases (18)		
Community Relationships	Community contacts report positive relationship with CPS (18)		
Population Trends			Increase in population, families with children, median income (18)

1: Carlson (1988); 2: Gilbert, Karski, & Frame (1997); 3: Giovannoni (1987); 4: Gryzlak, Wells, & Johnson (2005); 5: Hutchison (1988); 6: Hutchison (1989); 7: Jagannathan & Camasso (2013); 8: Johnson, Brown & Wells (2002); 9: Jones (1996); 10: Karski (1999); 11: McDaniel & Slack(2005); 12: McDaniel (2003); 13: Östberg (2014); 14: Schwab, Baumann, & Gober (1997); 15: Silva (2011); 17: Wells, Fluke & Brown (1995); 18: Wells, Lyons, Doueck, Brown & Thomas (2004)

^a Based on data from the Children's Bureau Screening Study

^b Based on data from the Emergency Response System Study, Alameda County, CA

^c Based on data from the Illinois Families Study (IFS)

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